

**1 AUGUST 1997**

**Safety**



**VEHICLE-MOUNTED ELEVATING AND  
ROTATING WORK PLATFORMS, MANUALLY-  
PROPELLED AND SELF-PROPELLED  
MOBILE WORK PLATFORMS, AND  
SCAFFOLDS (TOWERS)**

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The criteria in this standard are the Air Force's minimum safety, fire prevention, and occupational health requirements. Major commands (MAJCOM), direct reporting units (DRU), and field operating agencies (FOA) may supplement this standard when additional or more stringent safety, fire prevention, and health criteria are required. Refer to Air Force Instruction (AFI) 91-301, *Air Force Occupational and Environmental Safety, Fire Prevention, and Health (AFOSH) Program*, for instructions on processing supplements or variances. Report conflicts in guidance between this standard, federal standards, or other Air Force directives through MAJCOM, DRU, or FOA ground safety offices to Headquarters Air Force Safety Center, Ground Safety Division, Safety Engineering and Standards Branch (HQ AFSC/SEGS), 9700 Avenue G, SE, Suite 222, Kirtland AFB NM 87117-5670. Describe the conflict in detail and provide possible recommendations to resolve the conflict. Only MAJCOM, DRU, or FOA-endorsed correspondence will be forwarded to HQ AFSC/SEG for resolution.

This standard applies to all US Air Force organizations, including all US Air Force Reserve personnel and Air National Guard personnel when on federal service. This standard implements regulatory portions of applicable Occupational Safety and Health Administration (OSHA) standards.

This standard applies to vehicle-mounted elevating and rotating platforms — including work platforms, fire fighting aerial devices, and aircraft maintenance equipment (used for elevating one or more workers for the purpose of performing work). It also applies to all manually-propelled and self-propelled mobile work platforms (including ladder stands) and rolling (mobile) scaffolds (towers). In some cases, the Air Force changes the design of commercially purchased mobile work platforms and scaffolds or builds this equipment; therefore, essential information, that applies to supporting loads and how scaffolds are to be built, is included in this standard (also refer to OSHA 29 Code of Federal Regulations [CFR] 1910.28, *Safety Requirements for Scaffolding*). Also, rules and requirements for design, construction, and use of mobile work platforms and scaffolds are given.

The mention of trade names or commercial products in this standard is for illustration purposes and does not constitute endorsement or recommendation for use by the United States Air Force.

## **SUMMARY OF REVISIONS**

Administrative changes have been made to update this standard to electronic format. Paragraphs have been renumbered and references updated as required. Figures have been deleted. Minor changes are annotated by a vertical bar (|). **NOTE:** AFOSH 127-series standards are being converted to 91-series standards and the 161-series standards will become 48-series standards. However, not all standards have been converted as of the effective date of this standard. To help you locate these documents, references to AFOSH standards are stated in the updated series and standard number, with the outgoing series and standard number stated as “formerly designated as” in the ‘references’ section of attachment 1.

**1. Hazards and Human Factors.** The more common injuries are from electrocution, falls, and falling objects. The hazard of electrocution is increased when work platforms are used to provide access to energized high voltage circuits. Working from elevated platforms may also expose personnel to radio frequency (RF) radiation if they are within the line of sight of operating radar beams. Working at high levels affects people in different ways. Some workers may become dizzy or experience feelings of instability or vertigo. These effects may be compounded by moving the platform on which the person is standing. Human factors such as illness, fatigue, and physical defects may cause or contribute to mishaps. Unsafe personnel acts such as disregarding instructions, jumping from the platform, leaning too far out from the platform, and dropping or throwing tools and equipment from the elevated position also cause injuries. Property damage losses are usually caused by vehicle or equipment overloading or overextension of its designed capability.

## **2. Requirements:**

**2.1. General.** The potential for injury, death, and property damage is decreased by proper design of platforms and scaffolds (tower), by thorough training of operators, thorough inspections, good equipment maintenance, and supervisory enforcement of known safe work practices. Therefore, it is necessary for supervisors to ensure workers are physically capable of work at high elevations. Workers, too, must be alert to signs or symptoms from co-workers such as decreased performance, change in attitude, and (or) physical changes, etc., which could result in mishaps.

### **2.2. Vehicle-Mounted Elevating and Rotating Work Platforms:**

2.2.1. Procurement. Commercial aerial devices procured for Air Force fire fighting purposes will conform to National Fire Protection Association (NFPA) Standard 1904, *Aerial Ladder and Elevating Platform Fire Apparatus*. All other aerial devices procured from commercial sources will conform to American National Standards Institute (ANSI) A92.2, *Vehicle Mounted Elevating and Rotating Aerial Devices*. Aerial devices constructed by the Air Force to satisfy Air Force mission requirements will conform to ANSI Standard A92.2.

2.2.2. Modifications. Modifications will conform to ANSI Standard A92.2 and OSHA Standard 29 CFR 1910.67,

*Vehicle-Mounted Elevating and Rotating Work Platforms*. The modifications authorized include: temporary removal of installed equipment not necessary for a particular mission and (or) modifi-

cation to provide a new or improved capability. Any modification which removes or defeats any safety device or feature on an aerial device will not be permitted.

### 2.2.3. Clearances:

2.2.3.1. Electrical. When operating aerial lifts under, over, by, or near electric power lines, the following clearances will be maintained:

2.2.3.1.1. For lines rated at 50 kilovolts (kV) or less, the minimum clearance between the lines and any part of the aerial lift will be at least 10 feet (305 centimeter [cm]).

2.2.3.1.2. When the lines are rated in excess of 50 kV, the minimum clearance between the lines and any part of the aerial lift will be at least 10 feet (305 cm) plus 4 inches (10 cm) for each kilovolt in excess of 50 kV, or twice the length of the line insulator, but never less than 10 feet (305 cm).

**2.2.3.2. Exceptions.** The requirements set forth in paragraph 2.2.3. do not apply:

2.2.3.2.1. Where the work is performed from an aerial device insulated for the work and the work is performed by trained communications outside plant workers, line clearance tree-trimming employees, or exterior electric linemen; or,

2.2.3.2.2. Where the electric power transmission or distribution lines have been deenergized and visibly grounded at the point of work or where insulating barriers (which are not a part of or an attachment to the aerial lift) have been erected to prevent physical contact with the lines.

2.2.3.2.3. If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the lines being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier. (See AFOSH Standard 91-50, *Communications Cable, Antenna and Communications-Electronic [C-E] Systems*.)

2.2.3.2.4. If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) may be reduced to the distance given in table 1. (See AFOSH Standard 91-50.)

2.2.3.2.5. If an aerial lift or equipment contacts an electrical conductor, the vehicle, equipment, and attachments will be considered energized. Personnel standing on the ground shall not contact any part unless using protective equipment rated for the voltage. (See AFOSH Standard 91-50.)

2.2.4. Proximity Warning Devices. Proximity warning devices are available and may be installed on aerial platforms. The use of such devices does not release the operator from assuring compliance with the clearances specified in paragraph 2.2.3.

### 2.2.5. Inspection and Test Procedures:

2.2.5.1. Aerial ladders will be inspected and tested annually or immediately following any activity when it is known, or suspected, the ladder may have been loaded beyond the manufacturer's maximum load capacity, or immediately following any repair of a structural or mechanical component of the ladder assembly. The procedures in attachment 2 are the joint

responsibility of the principal operator and vehicle mechanic qualified to perform the annual inspection. A record of the inspections and tests will be documented on Air Force Form 1828, ***Vehicle Historical Record***.

Aerial devices used for fire fighting purposes will be inspected and tested at least annually to comply with NFPA Standard 1914, *Testing for Fire Department Aerial Devices*. Many of the tests and actions may be performed by qualified fire department personnel; however, it is recommended the actions and tests be performed by a third-party testing company or the aerial device manufacturer. A record of the action and tests will be documented on Air Force Form 1828.

**Table 1. Approach Distances for Qualified Employees — Alternating Current.**

<b><i>Voltage Range (Phase to Phase)</i></b>	<b><i>Minimum Approach Distance</i></b>
300 volts (V) and less	Avoid Contact
Over 300 V, not over 750 V	1 feet 0 inches (30.5 cm)
Over 750 V, not over 2 kV	1 feet 6 inches (46 cm)
Over 2 kV, not over 15 kV	2 feet 0 inches (61 cm)
Over 15 kV, not over 37 kV	3 feet 0 inches (91 cm)
Over 37 kV, not over 87.5 kV	3 feet 6 inches (107 cm)
Over 87.5 kV, not over 121 kV	4 feet 0 inches (122 cm)
Over 121 kV, not over 140 kV	4 feet 6 inches (137 cm)

2.2.5.2. Articulating and extendible boom platforms will be inspected and tested annually. Special inspections and tests will be conducted immediately following any use of the work platform when the work platform may have been loaded beyond the manufacturer's rated capacity, or immediately following any repair of a structural or mechanical component of the boom or work platform assembly. The inspection and test procedures in attachment 3 will be carried out jointly by the principal operator and a vehicle mechanic qualified to perform the annual inspection of the vehicle. A record of the inspection and test will be recorded on AF Form 1828. When the personnel platform is an attachment to a telescoping derrick or crane with a rated capacity higher than that of the work platform, test procedures contained herein will not apply and testing will be accomplished according to applicable technical order (TO) and (or) manufacturer's maintenance manual.

2.2.5.3. For information on the use of a crane or derrick to hoist personnel, utilizing work platforms, refer to AFOSH Standard 91-46, *Materials Handling and Storage Equipment*, Chapter 9, and OSHA Standard 29 CFR 1926.550, *Cranes and Derricks*.

## 2.2.6. Operations:

2.2.6.1. A manufacturer of aerial devices is required by ANSI Standard 92.2 to publish manuals and to provide for the distribution of the manuals to the dealers and direct sale purchasers. The manuals will be secured by the Air Force user of this equipment and be readily available for use by workers and contain:

2.2.6.1.1. Description, specifications, and ratings of the aerial device.

- 2.2.6.1.2. Operating instructions for the aerial device and its auxiliary systems.
- 2.2.6.1.3. Precautions relating to multiple configurations such as performing aerial work from a moving vehicle.
- 2.2.6.1.4. Instructions regarding routine and frequency of recommended maintenance.
- 2.2.6.1.5. Replacement part information.
- 2.2.6.1.6. Instruction markings per paragraph 2.2.6.2.
- 2.2.6.1.7. Operating instructions.
- 2.2.6.2. The manufacturer is also required to attach to each aerial device a plate or plates (located in a readily accessible area which is clearly visible) stating:
  - 2.2.6.2.1. Make, model, and manufacturer's serial number;
  - 2.2.6.2.2. Rated capacity;
  - 2.2.6.2.3. Platform height;
  - 2.2.6.2.4. Maximum recommended operating pressures of hydraulic or pneumatic systems, or both;
  - 2.2.6.2.5. Hazards inherent in the operation of an aerial device;
  - 2.2.6.2.6. Manufacturer's marking which describes the function of each control;
  - 2.2.6.2.7. Insulated or noninsulated; **NOTE:** Insulating aerial devices do not protect personnel from phase to phase or phase to ground contacts at the platform end.
  - 2.2.6.2.8. Qualification voltage and date of test;
  - 2.2.6.2.9. Year of manufacture;
  - 2.2.6.2.10. Number of platforms;
  - 2.2.6.2.11. Category of aerial device; and
  - 2.2.6.2.12. Manufacturer's rated line voltage. Where alternative configurations are possible, the plate will show by chart, schematic, or scale the capacities of all combinations in their operating positions and cautions or restrictions, or both, for operation of all alternate or combinations of alternate configurations. These plates will not be removed from the device, painted over, or otherwise made unavailable for reference by the operator.
- 2.2.6.3. Workers required to use vehicle-mounted elevating and rotating work platforms will be thoroughly trained in all aspects of the job before being assigned work with this equipment. This will include "hands-on-training" prior to actual participation in "on-the-job" training tasks. Completion of operator training and specific qualification will be entered in individual's training records (MIMICs or other data retrieval system).
- 2.2.6.4. Before a mobile unit is moved for travel, the aerial device will be secured in the specified lower traveling position (to prevent rotation) by the use of cradles or locking devices according to the manufacturer's instructions.
- 2.2.6.5. The unit will be visually inspected and the lift controls tested prior to each shift or day's work to determine the unit and controls are in safe working condition. The override fea-

ture explained in paragraph 2.2.6.6. will be tested at this time. A record of this test will be noted on Air Force Form 1806, ***Operator's Inspection Guide and Trouble Report***.

2.2.6.6. Articulating and extendible boom platforms, primarily designed as personnel carriers, will have both platform (upper) and lower controls. Upper controls will be in or beside the platform within easy reach of the operator. In order to prevent any inadvertent actuation of the boom positioning controls at the platform the use of an unlocking device shall precede the use of the control itself and shall be maintained simultaneously during the use of the controls. The unlocking device may be incorporated into each control. Lower controls will provide for overriding the upper controls. Controls will be plainly marked as to their function. The override mode shall be capable of preventing boom movement with the lower control station unattended. Lower level controls will not be operated unless permission has been obtained from the employee in the lift, except in case of emergency. Whenever a worker is in or on an elevated work platform, there will be at least one person qualified to operate the equipment stationed near the lower level control panel.

2.2.6.6.1. Emergency Stop. A control shall provided at the platform to effect an emergency stop of platform movement. This control shall not require continuous actuation for a stop condition.

2.2.6.6.2. Outrigger Controls. When the aerial device is equipped with outrigger controls, these controls shall be guarded to protect against inadvertent operation, and shall return to neutral when released by the operator. The controls shall be located so the operator can see the outrigger being operated.

2.2.6.7. Boom and basket load limits specified by the manufacturer will not be exceeded.

2.2.6.8. An aerial lift truck will not be moved when the boom is elevated in a working position with personnel in the basket, except for equipment which is specifically designed for this type of operation. In all cases, the manufacturer's operating instructions will be followed.

2.2.6.9. Vehicle-mounted elevating and rotating work platforms will not be used during high winds, electrical storms, or any other adverse weather conditions which could (when determined by a competent authority) endanger workers using the platform.

2.2.6.10. Platforms other than buckets or baskets shall include a guardrail system:

2.2.6.10.1. The guardrail system shall include a top rail around its upper periphery. The top rail shall be 42 inches high, above the platform surface, designed to withstand 300 pounds of force.

2.2.6.10.2. The guardrail system shall include at least one rail approximately midway between the top rail and the platform surface, designed to withstand 300 pounds of force.

2.2.6.10.3. The platform shall include toeboards on all sides. The minimum toeboard height shall be 4 inches. Toeboards may be omitted at the access opening.

2.2.6.10.4. The configuration of the aerial platform shall include access for personnel entering the platform when it is in the lowered position. Access steps or rungs shall have a slip-resistant surface. Flexible materials such as cables, chains, and rope may be used across access openings not more than 30 inches wide.

2.2.6.11. A body belt and lanyard (not to exceed 6 feet in length) will be worn by each bucket

and (or) platform occupant. The lanyard will be attached to the boom or basket.

2.2.6.12. Belting off to an adjacent pole, structure, or equipment while working from an aerial lift will NOT be permitted.

2.2.6.13. Workers will always stand firmly on the floor of the basket and will NOT sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

2.2.6.14. Climbers will NOT be worn while performing work from an aerial lift.

2.2.6.15. Aerial devices, including insulated aerial devices, will NOT be brought into contact with an electrical conductor. Workers will NOT rely on the dielectric capabilities of aerial devices.

2.2.6.16. When work is to be performed near a suspected source of nonionizing radiation (i.e., radar and microwave equipment), prior consultation with the host BES personnel is required. (Refer to AFOSH Standard 91-50 for further guidance.)

2.2.6.17. Before the aerial device is used, the worksite shall be surveyed for hazards such as:

2.2.6.17.1. Untamped earth fills.

2.2.6.17.2. Ditches.

2.2.6.17.3. Drop-offs and floor obstructions.

2.2.6.17.4. Debris.

2.2.6.17.5. Overhead obstructions and electrical conductors.

2.2.6.17.6. Weather conditions.

2.2.6.17.7. Presence of unauthorized persons.

2.2.6.18. Before and during each use, the operator shall:

2.2.6.18.1. Check for overhead obstructions and electrical conductors.

2.2.6.18.2. Ensure the load weight does not exceed the manufacturer's rated capacity for the platform and (or) load lifting device.

2.2.6.18.3. Ensure outriggers and stabilizers are used if the manufacturer's instructions require their use.

2.2.6.18.4. Ensure guardrails are properly installed and the gates are closed.

2.2.6.18.5. Use outrigger pads when necessary to provide firm footing.

2.2.6.18.6. Set brakes.

2.2.6.18.7. Chock wheels before using an aerial lift on an incline.

2.2.7. Maintenance and Repair of Powered and (or) Mobile Units:

2.2.7.1. If deficiencies that affect the safe operation of the equipment are discovered during the daily operator inspection (or during use), the equipment will immediately be removed from service until repairs can be made. When repairs are made to the ladder, boom, or work platform, the manufacturer's recommended maintenance procedures shall be followed and the tests outlined in paragraph 2.2.5. will be conducted prior to returning the aerial device to ser-

vice.

2.2.7.2. All repairs will be accomplished by qualified personnel.

## **2.3. Manually-Propelled and Self-Propelled Mobile Work Platform and Scaffolds (Towers):**

### **2.3.1. Working Loads:**

2.3.1.1. Work platforms and scaffolds will carry the designed load under varying circumstances depending upon the conditions of use. Aircraft maintenance work platform loads are specified in TOs for each type of mobile work platform. Parts, additions, or accessories necessary for the safe use of platforms and scaffolds will be an integral part of the design.

2.3.1.2. Specific design and construction requirements are not a part of this standard because of the wide variety of materials and design possibilities. However, the design used will produce a mobile ladder stand or scaffold that will safely hold the specified loads. The material selected will be strong enough to meet the test requirements and will be protected against corrosion and deterioration.

2.3.1.2.1. The design working load of ladder stands will be calculated on the basis of one or more 250-pound persons with 50 pounds of equipment each.

2.3.1.2.2. The design load of scaffolds will be calculated on the basis of:

2.3.1.2.2.1. Light — Designed and constructed to carry a work load of 25 pounds per square foot.

2.3.1.2.2.2. Medium — Designed and constructed to carry a work load of 50 pounds per square foot.

2.3.1.2.2.3. Heavy — Designed and constructed to carry a work load of 75 pounds per square foot.

### ***NOTE:***

Ladder stands and scaffolds will support at least four times the design workload.

2.3.1.3. The materials used in mobile ladder stands and scaffolds will permit the overall structure to conform to specifications of strength, dimensions, and weights outlined in this standard to safely support the design work load.

2.3.1.4. Bolts or other fasteners used to assemble ladders, scaffolds, and towers will be large enough and in sufficient amount at each connection to develop the designed strength of the unit.

2.3.1.5. The operator will ensure there are no sharp edges, burrs, or other hazards to personnel on exposed surfaces.

### **2.3.2. Work Levels:**

2.3.2.1. The maximum work level height will not be more than four times the minimum or least base dimension (width) of any mobile ladder stand or scaffold. Where the basic mobile unit does not meet this requirement, suitable outrigger frames will be used to obtain this least base dimension or the unit will be tied with guy wires or braced to keep the unit from tipping.

2.3.2.2. The minimum platform width for any work level will not be less than 20 inches for



mobile scaffolds (towers). Ladder stands will have a minimum step width of 16 inches.

2.3.2.3. The supporting structure for the work level will be rigidly braced, using cross bracing or diagonal bracing with rigid platforms at each work level.

2.3.2.4. The steps of ladder stands will be fabricated with slip-resistant treads or covered with a slip-resistant coating.

2.3.2.5. The work level platform of scaffolds will be of wood, aluminum, plywood planking, or steel or expanded metal, for the full width of the scaffold, except for necessary openings. Work platforms will be secured to the support structure. Planking will be 2-inch (nominal) scaffold grade minimum 1,500 fiber (f) (stress grade) construction grade lumber or equivalent.

2.3.2.6. Scaffold work platforms at work levels 10 feet or higher will have guardrails, mid-rails, and toeboards which meet the requirements outlined in paragraph 2.2.6.10.

2.3.2.7. Scaffolds will have a climbing ladder or stairway (for access and egress) which is either affixed or built into the scaffold. The ladder or stairway will be located so its use will not have a tendency to tip the scaffold. A landing platform will be provided at intervals not to exceed 30 feet.

2.3.2.8. When moving mobile units between engines on the same wing and along wing flaps (short distances), it is acceptable for no more than two workers to remain on the platform. Movement of manually-propelled mobile work platforms with personnel on the working platform is NOT allowed from one wing of an aircraft to the other, nor to other sections of the aircraft. Self-propelled elevating work platforms must be in the lowered position when traversing any distances greater than stated above. If equipment is left on the work platform when the unit is being moved, the equipment must rest securely on the platform protected by the rail or toeboard.

2.3.2.9. When using self-propelled mobile work platforms, which have manufacturer-installed structural anchor points and the platform is elevated 10 feet or more above the surface, body belts or harnesses shall be worn with lanyard attached to the structural anchor point. When self-propelled work platforms have not been manufactured with an approved structural anchor point, protective guardrails, midrails (when required), and toeboards must be installed on all open sides, except the side facing the structure (i.e., aircraft, buildings) when it is within 14 inches of the working surface.

2.3.2.10. Anchorages for lanyards which tie off one worker will be capable of supporting 5,000 pounds (22.2 kilonewton [kN]) per worker attached. They shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of two, under the supervision of a qualified person. (See OSHA Standard 29 CFR 1910.66, *Personal Fall Arrest System*, Appendix C.)

2.3.2.11. Lanyards, “D” rings, snap-hooks, and all components of a fall arrest system will be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN). (See OSHA Standard 29 CFR 1910.66, Appendix C.)

### 2.3.3. Operations:

2.3.3.1. The training requirements at paragraph 2.2.6.3. also apply to all manually-propelled elevating aerial platforms and self-propelled elevating work platforms.

2.3.3.2. The operator shall be aware that the operating and safety manuals, including the manual defining the responsibilities of dealers, owners, lessors, lessees, users, and operators, are stored on the aerial platform and the location where they are stored. The operator shall be familiar with the manuals stored on the aerial platform and consult them when questions arise with respect to the aerial platform.

2.3.3.3. Before use each day or at the beginning of each shift, the aerial platform shall be given a visual inspection and functional test including, but not limited to, the following:

2.3.3.3.1. Operating and emergency controls.

2.3.3.3.2. Safety devices.

2.3.3.3.3. Personal protective devices, including fall protection.

2.3.3.3.4. Air, hydraulic, and fuel system leaks.

2.3.3.3.5. Cables and wiring harness.

2.3.3.3.6. Loose or missing parts.

2.3.3.3.7. Tires and wheels.

2.3.3.3.8. Placards, warnings, and control markings.

2.3.3.3.9. Outriggers, stabilizers, and other structures.

2.3.3.3.10. Guardrail system.

2.3.3.3.11. Items specified by the manufacturer.

2.3.3.4. Refer to paragraph 2.2.6.17. for workplace inspection information.

2.3.3.5. The operator shall ensure the following before each elevation of the platform:

2.3.3.5.1. The aerial platform is operated on a surface within the limits specified by the manufacturer.

2.3.3.5.2. The outriggers, stabilizers, extendable axles, or other stability enhancing means are used as required by the manufacturer.

2.3.3.5.3. Guardrails are installed and access gates or openings are closed per manufacturer's instructions.

2.3.3.5.4. The load and its distribution on the platform and any platform extensions are according to the manufacturer's rated capacity for the specific configuration.

2.3.3.5.5. There is adequate clearance from overhead obstructions.

2.3.3.5.6. Minimum safe approach distances to energized power lines and parts are maintained.

2.3.3.5.7. The operator and all other personnel on the platform wear fall protection devices and other safety gear, as required at all times.

2.3.3.6. Users shall inspect and maintain the aerial platform as required to ensure proper operation. The frequency of inspection and maintenance shall be determined by the manufacturer's recommendation and be compatible with operating conditions and the severity of the operating environment. Aerial platforms that are not in proper operating condition shall be immediately

removed from service until repaired. Repairs shall be made by a qualified person and the repairs shall be in conformance with the manufacturer's recommendations.

2.3.3.7. The following requirements for controls of manually elevated platforms will be met:

2.3.3.7.1. Direction and function are clearly marked;

2.3.3.7.2. Platform elevating and lowering mechanisms are self-holding; and

2.3.3.7.3. Platform elevating and lowering mechanisms are readily accessible from the ground. Controls at the platform are optional.

2.3.3.8. The following requirements for upper controls of power elevated platforms will be met:

2.3.3.8.1. Are clearly marked as to direction and function;

2.3.3.8.2. Are of the type that automatically return to the off or neutral position when released;

2.3.3.8.3. Are protected against inadvertent operation;

2.3.3.8.4. Are readily accessible to the operator;

2.3.3.8.5. Include a control that must be continuously activated in order for upper controls to be operational and that automatically returns to the off position when released.

2.3.3.9. Any aerial platform equipped with a powered elevating assembly shall have a clearly marked emergency lowering means readily accessible from ground level.

2.3.3.10. The aerial platform shall be equipped with a readily identifiable emergency stop device, located at the upper control and lower control stations, that will deactivate all powered functions that affect the movement of the platform.

2.3.3.11. The control system shall be designed so a single malfunction in the control system will not result in unintended movement of the platform.

2.3.4. Wheels or Casters:

2.3.4.1. Wheels or casters will be of proper design for strength and dimensions to support four times the design working load.

2.3.4.2. Scaffold casters will be provided with a positive wheel and (or) swivel lock to prevent movement. Two of the four casters on ladder stands will be lockable and the swivel type.

2.3.4.3. Where leveling of the elevated work platform is required, screwjacks or other suitable means for adjusting the height will be provided.

2.3.4.4. A minimum of two brakes, wheel locks, or permanently installed jacks will be operable on all mobile work platforms.

2.3.5. Mobile Tubular Welded Frame Scaffolds:

2.3.5.1. Units will be designed to comply with the requirements of paragraphs 2.3.1, 2.3.2, and 2.3.4.

2.3.5.2. Scaffolds will be properly braced by cross braces and (or) diagonal braces for securing vertical members together laterally. The cross braces will be of a length that will automat-

ically square and align vertical members so the erected scaffold is always plumb, square, and rigid.

2.3.5.3. Spacing of panels or frames will be consistent with the loads imposed. The frames will be placed one on top of the other with coupling or stacking pins to provide proper vertical alignment of the legs.

2.3.5.4. Where uplift may occur, panels will be locked together vertically by pins or other equivalent means.

2.3.5.5. The erection of a scaffold exceeding 50 feet in height above the base will be done according to the manufacturer's instructions under the supervision of a qualified professional engineer. The base civil engineering activity is the authorizing agency for scaffold erection.

#### 2.3.6. Mobile Tubular Welded Sectional Folding Scaffolds:

2.3.6.1. General. Units, including sectional stairway and sectional ladder scaffolds, will be designed to comply with the requirements of paragraphs 2.3.1, 2.3.2, and 2.3.4.

2.3.6.2. Stairway. A stairway and work platform will be part of the structure of each sectional folding stairway scaffold.

2.3.6.2.1. A set of pivoting and hinged folding diagonal and horizontal braces.

2.3.6.2.2. A detachable work platform.

2.3.6.3. Sectional Folding Stairway Scaffolds. These will be designed as medium duty scaffolds except when they are equipped with a "high clearance" base section.

High clearance bases have a greater open space so the scaffold may be placed over an obstruction such as machinery or shrubbery. These special base sections will be designed as light duty scaffolds. When high clearance bases are used to support upper sectional folding stairway scaffolds, the load capacity of the entire scaffold will be reduced accordingly. A sectional folding stairway scaffold will not exceed 4 and 1/2 feet in width and 6 feet in length.

2.3.6.4. Sectional Folding Ladder Scaffolds. Sectional folding ladder scaffolds will be designed as light duty scaffolds including the special base (open end) sections which are designed for high clearance (over obstructions). For certain special applications the 6-foot folding ladder scaffolds, except special high clearance base sections, will be designed for use as medium duty scaffolds. The width of a sectional folding ladder scaffold will not exceed 6 feet 6 inches for a 6-foot long unit, 8 feet 6 inches for an 8-foot unit, or 10 feet 6 inches for a 10-foot long unit. Each sectional folding ladder scaffold will contain:

2.3.6.5. End Frames. The end frames of sectional ladder and stairway scaffolds will be designed so the horizontal bearers provide support for multiple planking levels.

2.3.6.6. Erection of Scaffold. Refer to paragraph 2.3.5.5.

#### 2.3.7. Mobile Tube and Coupler Scaffolds:

2.3.7.1. Design. Units will be designed to comply with the applicable requirements of paragraphs 2.3.1, 2.3.2, and 2.3.4.

2.3.7.2. Material. The material used for the couplers will be of a structural type, such as a drop-forged steel, malleable iron, or structural grade aluminum. The use of gray cast iron is

prohibited.

2.3.7.3. Erection of Scaffold. Refer to paragraph 2.3.5.5.

2.3.8. Mobile Work Platforms:

2.3.8.1. Design. Units will be designed for the use intended and will comply with the requirements of paragraphs 2.3.1, 2.3.2, and 2.3.4.

2.3.8.2. Base Width. The minimum base width will conform to paragraph 2.3.2.2.

2.3.8.3. Bracing. Rigid diagonal bracing to vertical members will be provided.

2.3.9. Mobile Ladder Stands:

2.3.9.1. Design. Units will comply with applicable requirements of paragraphs 2.3.1, 2.3.2, and 2.3.4.

2.3.9.2. Base Width. The minimum base width will conform to paragraph 2.3.2.2. The maximum length of the base section will be the total length of combined steps and top assembly, measured horizontally, plus five-eighths of an inch per step of rise.

2.3.9.3. Steps. Steps will be uniformly spaced, with a rise of not less than 9 inches, nor more than 10 inches, and a depth of not less than 7 inches. The slope of the steps section will be a minimum of 55 degrees and a maximum of 60 degrees measured from the horizontal.

2.3.9.4. Handrails:

2.3.9.4.1. Units having more than four steps or 60 inches vertical height to the top step will be equipped with handrails.

2.3.9.4.2. Handrails will be a minimum of 29 inches high and will be the same height all along the step. Measurements will be taken vertically from the center of the step.

2.3.9.4.3. Load design will meet requirements of paragraph 2.3.1.2.1.

2.3.10. Mobile Work Platforms and Ladder Stands:

2.3.10.1. Aircraft maintenance platforms and stands fall within criteria specified in paragraphs 2.3.8. and 2.3.9. For the most part, aircraft maintenance platforms are mobile work platforms. However, when configured with steps to reach work levels, they are required to meet the criteria of mobile ladder stands relative to step dimensions and handrails.

2.3.10.2. Aircraft maintenance platforms and stands will be maintained free of grease, oil, accumulation of ice, snow, mud, or any other slippery substance or object which could cause slips and falls. Step treads and walking surfaces will be maintained in good repair. Repairs will be made by replacing worn surfaces with suitable materials or made safe by using abrasive or nonslip surfacing agents.

2.3.10.3. Removable protective guardrails, (midrails when required), and toeboards may be provided on mobile work platforms in lieu of those permanently affixed. Work platforms positioned 14 or more inches from the working surface (i.e., aircraft, buildings) will have guardrails (and toeboards, if work levels are 10 feet or higher above the ground or floor) installed on all open sides. Guardrails and toeboards will meet the criteria of paragraph 2.2.6.10. and will be used on all work platforms.

2.3.10.4. Prior to any user ascending to a raised portion of a mobile platform, all locking devices (i.e., pins, collars, etc.) will be installed; hydraulic pressure shall be released and the platform slowly lowered until locking devices are securely engaged; and hydraulic pressure valve(s) shall be closed. If the raisable portion of the platform cannot be elevated from ground level, the user may ascend to that platform portion and adjust the platform height. However, prior to any task and (or) work being started, the requirements for locking devices, pressure release, and closing valves will be met.

2.3.10.5. Reflective materials for marking mobile work platforms will be used to the maximum extent authorized by the appropriate TOs, such as 36-1-3, *Painting, Marking, and Lighting Requirements for USAF Vehicles*, and 35-1-3, *Corrosion Prevention, Painting and Marking USAF Equipment*. When not being transported, mobile work platforms will be secured to prevent collision with aircraft, vehicles, or other equipment. Those units with a designated flight line storage area for mobile work platforms will have the area approved by ground safety officials. (See AFOSH Standard 91-100, *Aircraft Flight Line - Ground Operations and Activities*, for further guidance.)

2.3.10.6. Mobile work platforms will be inspected by the user daily, before use. Items to be inspected will include brakes, jacks, wheel locks, securing cables, locking pins, hydraulic systems, anchor connections, and overall equipment condition. While any mobile work platform is in use, the user shall lock all wheel brakes, lock all casters to prevent swiveling, and (if so equipped) set all floor jacks.

2.3.10.7. When mobile work platforms are being moved:

2.3.10.7.1. Under certain restrictive conditions, personnel and equipment may remain on work platforms when they are being moved. (See paragraph 2.3.2.8.)

2.3.10.7.2. When platforms are to be towed, they will be equipped with hitches designed for such purpose.

2.3.10.7.3. When platforms are being towed by vehicles, the following rules apply:

2.3.10.7.3.1. Towing speed is 5 miles per hour for two or more maintenance stands. Towing speed for one maintenance stand is 10 miles per hour. However, should surfaces and terrain make it necessary, speed will be reduced accordingly.

2.3.10.7.3.2. No more than four type B1, B4, B5, and similar small stands may be towed as follows: two sets of two in tandem on a double hitch or two in tandem on a single hitch. Type B3, J7, and similar large stands will be towed singly on a center mounted hitch. Four-wheeled units will not be towed behind two-wheeled units. Large pieces of AGE, when towed in tandem, will not block the driver's vision of the last item being towed.

2.3.10.7.3.3. Safety pins will be used to secure pintle hooks and trailer hitches.

2.3.10.8. When mobile work platforms are used in operations such as fuel cell repair or refueling vehicle maintenance where static electricity is hazardous to the work operation, the platform will be grounded and equipped with static discharge plates to allow personnel to dissipate accumulated static electricity.

2.3.10.9. Maintenance of mobile work platforms and ladder stands will be done as specified

in the appropriate 35-series TOs.

ORIN L. GODSEY, Brig Gen, USAF  
Chief of Safety

## Attachment 1

### GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

#### *References*

Air Force Instruction (AFI) 24-301, *Vehicle Operations* (formerly designated Air Force Regulation [AFR] 77-310, Volume 2).

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Prevention, and Health (AFOSH) Program*.

Air Force Manual (AFMAN) 24-307, *Procedures for Vehicle Maintenance Management (Aircraft Towing, Base Maintenance, Deicers, High Reach, and Snow Removal)*.

Air Force Occupational Safety and Health (AFOSH) Standard 48-9, *Exposure to Radiofrequency Radiation* (formerly designated AFOSH Standard 161-9).

AFOSH Standard 91-50, *Communications Cable, Antenna and Communications-Electronic (C-E) Systems*.

AFOSH Standard 91-22, *Walking Surfaces, Guarding Floor and Wall Openings and Holes, Fixed Industrial Stairs, and Portable and Fixed Ladders* (formerly designated AFOSH Standard 127-22).

AFOSH Standard 91-46, *Materials Handling and Storage Equipment* (formerly designated AFOSH Standard 127-46).

AFOSH Standard 91-100, *Aircraft Flight Line - Ground Operations and Activities* (formerly designated AFOSH Standard 127-100).

American National Standards Institute (ANSI) Standard A92-2, *Vehicle Mounted Elevating Rotating Aerial Devices*.

ANSI Standard A92-3, *Manual Propelled Elevating Work Platforms*.

ANSI Standard A92-6, *Self-Propelled Elevating Work Platforms*.

National Fire Protection Association (NFPA) Standard 1904, *Aerial Ladder and Elevating Platform Fire Apparatus*.

NFPA Standard 1914, *Testing Fire Department Aerial Devices*.

Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.21, Subpart D, *Walking and Working Surfaces, Definitions*.

OSHA Standard 29 CFR 1910.29, *Manually Propelled Mobile Ladder Stands and Scaffolds (Towers)*.

OSHA Standard 29 CFR 1910.66, Appendix C, *Personal Fall Arrest System*.

OSHA Standard 29 CFR 1910.67, *Vehicle-Mounted Elevating and Rotating Work Platforms*.

OSHA Standard 29 CFR 1926.550, *Cranes and Derricks*.

Technical Order (TO) 00-20B-5, *USAF Motor Vehicle and Vehicular Equipment Inspection*.

TO 35-1-3, *Corrosion Prevention - Painting and Marking of USAF Support Equipment*

TO 36-1-3, *Painting, Marking, and Lighting Requirements for USAF Vehicles*.



TO 36C-1-4, *Dielectric Testing of Insulated Aerial Manlift Devices*.

***Abbreviations and Acronyms***

**AC**—Alternating Current

**AFI**—Air Force Instruction (New Designation)

**AFM**—Air Force Manual (Obsolete Designation)

**AFMAN**—Air Force Manual (New Designation)

**AFOSH**—Air Force Occupational Safety and Health

**AFR**—Air Force Regulation (Obsolete Designation)

**AFSC**—Air Force Safety Center

**ANG**—Air National Guard

**ANSI**—American National Standards Institute

**cm**—Centimeter

**CFR**—Code of Federal Regulations

**DC**—Direct Current

**DRU**—Direct Reporting Unit

**f**—Fiber

**FOA**—Field Operating Agency

**HQ**—Headquarters

**kN**—Kilonewton

**kV**—Kilovolt

**MAJCOM**—Major Command

**NFPA**—National Fire Protection Association

**OSHA**—Occupational Safety and Health Administration

**RF**—Radiofrequency

**TO**—Technical Order

**V**—Volts

***Terms***

**Aerial Device.**—Any vehicle-mounted device, telescoping or articulating or both, which is used to elevate personnel to job sites above ground. These devices include extendible boom platforms, vertical towers, and a combination of the above.

**Aerial Ladder.**—An aerial device consisting of a single or multiple-section extendible ladder.

**Articulating Boom Platform.**—An aerial device with two or more hinged boom sections.

**Bearer.**—A horizontal part of a scaffold on which the platform rests and which may be held in place by ledgers.

**Brace.**—A tie that holds one scaffold part in a fixed place with respect to another part.

**Climbing Ladder.**— A separate or built-in ladder with rungs that are spaced at equal distance and are attached to the scaffold so people can climb and descend.

**Coupler.**—A device for locking together the parts of a tubular metal scaffold; designed and used to safely support the maximum intended loads.

**Design Working Load.**—The maximum intended load, being the total of all loads including the weight of the workers, materials, equipment, and platform.

**Equivalent.**—Alternative design or features which will give an equal degree or factor of safety.

**Extendible Boom Platform.**—An aerial device (except ladders) with a telescopic or extendible boom. Telescopic derricks with personnel platform attachments will be considered to be extendible boom platforms when used with a personnel platform.

**Guardrail.**—A barrier connected to the uprights and along the exposed sides and ends of platforms to keep people from falling.

**Handrail.**—A rail, connected to a ladder stand, for grasping to provide support.

**Insulated Aerial Device.**—An aerial device designed for work near energized electrical lines and apparatus.

**Ladder Stand.**—A mobile fixed size, self-support ladder that is made up of a wide flat tread ladder in the form of stairs. The ladder stand may include handrails.

**Ledger (Stringer).**—A horizontal part of a scaffold which extends from post to post which supports the bearer forming a tie between the posts.

**May**—Indicates an acceptable or satisfactory method of accomplishment.

**Mobile Scaffold (Tower).**—A light, medium, or heavy duty scaffold that is mounted on casters or wheels.

**Mobile Unit.**—A combination of an aerial device, its vehicle, and related equipment.

**Mobile Work Platform.**—A scaffold that provides a work level, one or more frames high, on casters or wheels, with bracing across or diagonally from the platform to the posts.

**Platform.**—Any personnel-carrying device (basket or bucket) which is a component of a mobile unit.

**Rated Line Voltage.**—The manufacturer's recommended safe working line voltage.

**Runner.**—The lengthwise horizontal bracing and (or) bearing members.

**Scaffold.**—Any temporary raised platform and all of the necessary vertical, diagonal, and horizontal parts used for

supporting workers and materials (also known as a scaffold tower).

**Shall**—Indicates a mandatory requirement.

**Should**—Indicates a preferred method of accomplishment.

**Toeboard.**—A vertical barrier placed at level erected along exposed edges to prevent materials from falling off the platform.

**Tube and Coupler Scaffold.**—A scaffold that is made up of tubing used as posts, bearers, braces, ties, and runners a base supporting the posts, and uprights that serve to join the various members. This type of scaffold is normally used in fixed locations.

**Tubular—Welded Frame Scaffold.** A sectional, panel, or frame metal scaffold mainly built of prefabricated welded sections. This scaffold consists of posts and bearers with intermediate connecting parts and is braced with diagonal or cross braces-

**Tubular Welded Sectional Folding Scaffold.**—A sectional, folding metal scaffold either designed as a ladder frame or inside stairway. It is built of prefabricated welded sections, which consist of end frames, platform frame, inside inclined stairway frame and braces, or hinged connected diagonal and horizontal braces. It can be folded into a flat package when the scaffold is not in use.

**Vehicle.**—Any carrier that is not manually propelled. A vehicle is a stable support for the aerial device.

**Vertical Tower.**—An aerial device designed to elevate a platform on a vertical axis.

**Will**—Is also used to indicate a mandatory requirement and in addition is used to express a declaration of intent, probability, or determination.

**Work Level.**—A raised platform, used for supporting workers and their materials, made up of the necessary vertical, horizontal, and diagonal braces, guardrails, and ladder for access to the work platform.

## **Attachment 2**

### **INSPECTION AND TEST PROCEDURES FOR AERIAL LADDERS**

**A2.1.** Before any test is conducted, make a thorough inspection as outlined below and prepare test equipment for use. Include the following in the preliminary check:

A2.1.1. Inspect the ladder carefully to ensure the truss posts are vertical, the longitudinal trusses are straight, and there are no dents.

A2.1.2. Check the ladder beams for bends, depression, or other evidence of rough usage.

A2.1.3. Check the ladder for evidence of loose rungs or rivets or cracks at welds.

**A2.2.** Conduct the tests in still air to avoid dynamic loading of the ladder.

**A2.3.** Maintain close watch during the test to see that the ladder rails remain square and there is no evidence of twist in the ladder. If the ladder shows twist at any time, discontinue the test immediately and take the ladder out of service until the cause of the twist is determined and repairs are made.

**A2.4.** Use a 400-pound test load.

**A2.5.** Use the following test procedures when testing metal aerial ladders which can be fully extended in a horizontal position over the rear of the vehicle.

A2.5.1. Ensure the vehicle is on a level surface or road (whenever possible). In addition, ensure all outriggers are down and have a firm footing on the ground and the aerial turntable is level.

A2.5.2. With the ladder supported by the apparatus bedding arches, extend the aerial ladder sections fully to the rear.

A2.5.3. Place a 50-pound weight on a board spanning the second and third rungs from the top end of the top section.

A2.5.4. Measure the distance from the underside of the rear rung to the ground.

A2.5.5. Remove the board and the 50-pound weight and retract the sections fully; attach a testing bracket and cable to the top rung of the top section.

A2.5.6. Elevate the ladder to 60 degrees, rotate the turntable if necessary until the ladder is over either the front or rear of the aerial apparatus vehicle, and then extend the ladder until each section is two rungs short of full extension.

A2.5.7. Secure the testing equipment to the cable. Ensure there is a 60-inch clearance from the ground.

A2.5.8. Add weight carefully until total load (weight bracket cable, etc.) is equal to the test weight of 400 pounds. Do not drop weights or "shock load" the ladder. Keep the maximum test weight on the ladder for 5 minutes.

A2.5.9. Remove test weight from ladder.

A2.5.10. With the ladder supported by the apparatus bedding arches, extend the aerial ladder sections fully and add the 50-pound weight and repeat steps in A2.5.2. and A2.5.3.

A2.5.11. If the measurement taken in A2.5.10. is within 2 inches of the measurement taken in step A2.5.4., the ladder is in a satisfactory condition for continued use.

## **Attachment 3**

### **INSPECTION AND TEST PROCEDURES FOR ARTICULATING AND EXTENDIBLE BOOM PLATFORMS**

**A3.1.** The inspection and tests described are to supplement, not to replace or modify, any instructions recommended by the manufacturers in their maintenance manuals. Since each manufacturer's unit will be somewhat different, specific attention will be given to the manufacturer's instructions concerning periodic maintenance and inspection checks of the elevating platform systems.

**A3.2.** The visual inspection of the equipment is intended to detect any visible defects, damage, or improperly secured parts. Any problems detected during this examination will be corrected prior to proceeding to subsequent tests. The following items will be inspected.

#### **A3.2.1. Frame and Mainframe:**

A3.2.1.1. Check pins holding outrigger cylinder and outrigger legs for proper installation and fastener security.

A3.2.1.2. Inspect all welds for cracks or fractures.

A3.2.1.3. Check bolts holding rotation gear for proper tightness.

A3.2.1.4. Check tie-down bolts for tightness.

A3.2.1.5. Check all hydraulic components and cylinders for external oil leakage.

A3.2.1.6. Check rotary hydraulic manifold for proper attachment and fastening.

#### **A3.2.2. Turntable:**

A3.2.2.1. Check fasteners retaining turntable to rotation mechanism for proper tightness.

A3.2.2.2. Inspect turntable structure for weld cracks or fractures.

A3.2.2.3. Check pins securing cylinders to boom and turntable for proper installation and fastener security.

A3.2.2.4. Check hydraulic hoses, tubing, and connections for chafing, kinks, or oil leaks.

A3.2.2.5. Check centerpost manifold for oil leaks.

A3.2.2.6. Check hydraulic cylinder and holding valves for any sign of damage or oil leaks.

A3.2.2.7. Check wiring and electrical swivels.

#### **A3.2.3. Booms:**

A3.2.3.1. Check all boom pivot pins and upper cylinder pins for proper installation and fastener security.

A3.2.3.2. Inspect entire booms for visible defects such as weld cracks, dents, or misalignment, particularly in areas of cylinder attachment.

A3.2.3.3. Check all hydraulic hoses, tubing, and connections for chafing, kinks, or oil leaks.

A3.2.3.4. For articulated boom elevating platforms, after checking the upper boom, raise the upper boom from the lower boom to provide access for checking the upper cylinder and area

between the two booms. In the case of telescopic elevating platforms, extend the boom to its maximum extension.

**A3.2.4. Cylinders:**

A3.2.4.1. Check pins securing cylinders.

A3.2.4.2. Check cylinder end glands.

A3.2.4.3. Check cylinder piston rods for damage.

**A3.2.5. Platform Basket:**

A3.2.5.1. Check all control linkage for proper installation, adjustment, and free movement.

A3.2.5.2. Check platform basket structure for visible defects such as weld cracks, dents, or bends, particularly in the area of attachment to the boom.

A3.2.5.3. Check hydraulic tubing and hoses for any chafing, kinks, or oil leaks.

**A3.2.6. Platform Basket Leveling System:**

A3.2.6.1. Check all leveling components for visible defects such as weld cracks, bent areas, frayed cables, and loose cable terminals.

A3.2.6.2. Check all pins for proper installation and security.

**A3.3.** After satisfactorily completing a visual examination, an operational test will be performed to determine that the hydraulic system, safety systems, and all structural mechanisms are performing in a normal manner. For this test, the aerial device will be placed on a hard level surface in an open area where full movement of the booms through their complete operating range is allowed.

A3.3.1. Hydraulic System. Check hydraulic pressure to see that it is within limits recommended by the manufacturer.

A3.3.2. Outriggers. After engaging the hydraulic drive pump (either power take off or auxiliary engine operated) extend the outriggers to proper engagement with the ground as recommended by the manufacturer. Note any unusual operation of the outriggers during lowering. Check the interlock system.

A3.3.3. Operation From Lower Controls. Operate the elevating platform in all positions using the lower or ground controls. Include movement of platform basket from ground to maximum elevation. In addition, revolve the platform basket 360 degrees to the left and to the right while the unit is at its maximum horizontal reach.

**A3.3.4. Operation From Platform Controls:**

A3.3.4.1. With only one operator in the platform basket, once again move the booms through all positions, operating from the platform control station. Any time an operation is accomplished with a person in the platform basket, ensure a second person stands at the lower control station.

A3.3.4.2. Check all operation safety devices to determine proper operation.

A3.3.4.3. Check platform basket deactivation valve from ground or lower controls to determine proper operation.

A3.3.4.4. Observe proper leveling of the platform basket as the booms are moved.

A3.3.4.5. With hydraulic pump stopped, check pilot-operated holding valves on cylinders to determine their proper operation in holding the booms in position without power.

**A3.4.** With the unit located on a hard level surface and sufficient room for unrestricted boom movement, a stability and structural test will be performed to determine the ability of the boom to perform properly while carrying rated capacity loads in the platform basket. (Manufacturers test new equipment platform basket loads in excess of rated capacity. Stability and structural testing by the user should be conducted only to rated capacity. If a test beyond rated load is required, the test should be conducted by, or in the presence of, a representative of the manufacturer.)

A3.4.1. Properly stabilize the unit according to the manufacturer's recommendation. Give stability, placement loading, and speed careful consideration.

A3.4.2. Place the platform basket near the ground and load to rated capacity. (Subtract the weight of equipment which has been added to the platform basket after delivery from the manufacturer from the rating.)

A3.4.3. Operate the unit from the lower controls through all allowable phases of operation:

A3.4.3.1. Check the outriggers for evidence of any instability.

A3.4.3.2. Check all boom movements for any abnormal noise, vibration, or deflection.

A3.4.3.3. Check platform for proper leveling.

A3.4.3.4. Check weld joints at outrigger structure, outriggers, frame, mainframe, frame reinforcements, turntable, cylinder anchors, boom joints, leveling system, platform basket, and pivot pin bosses for cracks, dents, misalignment, etc.

**A3.5.** The following will be accomplished when conducting a dielectric test of insulated aerial devices:

A3.5.1. To ensure aerial lift boom and work platform insulation provides personnel protection from electrical shock, periodic dielectric tests on insulated portions of this type of equipment will be conducted. The person responsible for this test will be the principal operator of the equipment. Tests will be conducted at least semi-annually with additional tests performed depending on the unit's activity, severity of service, and environmental conditions. Dielectric tests will also be conducted prior to returning an aerial lift to service when:

A3.5.1.1. Repairs have been made to boom or aerial basket.

A3.5.1.2. Aerial basket has been removed and reinstalled.

A3.5.1.3. Repairs or replacement have been accomplished on cables or insulated cable connecting links.

A3.5.1.4. Replacement has been accomplished on boom-associated hydraulic or air lines.

A3.5.1.5. Hydraulic oil has been changed.

A3.5.2. Air Force-owned insulated aerial platform units are factory certified when new, for use below 69 kV -alternating current (AC). Equivalent AC and direct current (DC) test voltages are listed in TO 36C-1-4, *Dielectric Testing of Insulated Aerial Manlift Devices*. The minimum DC test voltage for maintenance testing 69 kV and below booms or aerial platforms is 100 kV DC. All persons operating high voltage equipment will be constantly aware of the inherent dangers of high voltage. Adequate precautions will be taken to prevent the operator and observers from coming into contact with high

voltage during a test. Steel winch cables of line maintenance derrick trucks will be removed from the head sheave and fiberglass pull-out extension before conducting a field test.

A3.5.3. Insulation test failures are usually attributable to wet or dirty conditions and can be corrected either by letting the equipment dry out or cleaning it according to the manufacturer's recommendations. It is the operator's responsibility to maintain the equipment in a clean, dry condition to ensure that the insulation qualities are maintained. Suitable covers should be used as an aid to keeping this equipment clean and dry.



## **Attachment 4**

### **ALL PURPOSE CHECKLIST**

Vehicle-Mounted Elevating and Rotating Work Platforms, Manually-Propelled and Self-Propelled Mobile Work Platforms, and Scaffolds (Towers)

This is not an all-inclusive checklist. It simply highlights some critical items in this standard. Other requirements exist that are not included in the checklist. Where appropriate, MAJCOMs, DRUs, FOAs, local safety personnel, and supervisors will add to this checklist to include command or individual shop-unique requirements or situations.

Clearances:

A4.1. Do operators of aerial lifts operating near electric power lines maintain clearances as required by paragraph 2.2.3?

A4.2. Are operators of aerial lifts aware that the use of proximity devices do not release them from the responsibility of assuring compliance with clearances required by paragraph 2.2.3? (Reference paragraph 2.2.4.)

Inspection and Test Procedures:

A4.3. Are aerial ladders inspected and tested annually, and:

A4.3.1. When it is known or suspected the ladder may have been loaded beyond the manufacturer's rated capacity? (Reference paragraph 2.2.5.1.)

A4.3.2. Immediately following any repair of a structural or mechanical component of the ladder assembly? (Preference paragraph 2.2.5.1.)

A4.4. Is Attachment 2 used as a guide by the principal operator and a qualified vehicle mechanic while performing tests or annual inspections of aerial ladders? (Reference paragraph 2.2.5.1.)

A4.5. Are articulating and extendible boom platforms inspected and tested annually, and:

A4.5.1. When it is known or suspected that the work platform may have been loaded beyond the manufacturer's rated capacity? (Reference paragraph 2.2.5.2.)

A4.5.2. Immediately following any repair of a structural or mechanical component of the boom or work platform assembly? (Reference paragraph 2.2.5.2.)

A4.6. Is Attachment 3 used as a guide by the principal vehicle operator and a qualified vehicle mechanic while performing tests or annual inspections of articulated and extendible boom platforms? (Reference paragraph 2.2.5.2.)

A4.7. Are tests and inspections recorded on AF Form 1828? (Reference paragraphs 2.2.5.1. and 2.2.5.2.)

#### Operations:

A4.8. Is the manufacturer's operator's manual for the aerial device available for use by operators, and does it contain the information outlined in paragraph 2.2.6.1.?

A4.9. Have operators of vehicle-mounted elevating and rotating work platforms been thoroughly trained and qualified in the use of this equipment? (Reference paragraph 2.2.6.3.)

A4.10. Are surfaces of mobile work platforms and scaffolds protected from corrosion or other deterioration? (Reference paragraph 2.3.1.2.)

A4.11. Are all exposed surfaces of ladder stands, work platforms, or scaffolds free of sharp edges, burrs, or other hazardous projections? (Reference paragraph 2.3.1.5.)

A4.12. Is the maximum work level height of mobile ladder stands or scaffolds restricted to a level no greater than four times the least base dimension of the supporting frame? (Reference paragraph 2.3.2.1.)

*NOTE:* This level may be exceeded if design includes use of outriggers or unit is secured to fixed structure to prevent tipping and (or) falling of work platform.

A4.13. Are the supporting structures for the work levels rigidly braced? (Reference paragraph 2.3.2.3.)

A4.14. Are the steps of all ladder stands constructed of slip-resistant materials or covered with a slip-resistant coating? (Reference paragraph 2.3.2.4.)

A4.15. Is the work level platform of scaffolds extended to full width of scaffold secured to the support structure, and of sufficient strength to safely support the workload? (Reference paragraph 2.3.2.5.)

A4.16. Are guardrails, midrails (when required), and toeboards installed at work platform level of all scaffolding with work levels 10 feet or more above ground or floor level? (Reference paragraph 2.3.2.6.)

A4.17. Are scaffolds provided with a climbing ladder for access and egress? (Reference paragraph 2.3.2.7.)

A4.18. Do supervisors ensure that personnel are not allowed to remain on manually-propelled work platforms when they are being moved from one wing of an aircraft to the other, nor to other sections of the aircraft? (Reference paragraph 2.3.2.8.)

A4.19. Are at least two of four casters on ladder stands or work platforms equipped with positive swivel locks or wheel locks to prevent movement? (Reference paragraph 2.3.4.2.)

A4.20. When leveling elevated work platform is required, are screwjacks or other suitable means for adjusting the height provided? (Reference paragraph 2.3.4.3.)

A4.21. Is there a minimum of two brakes, wheel locks, or permanently installed jacks operational on all mobile work platforms? (Reference paragraph 2.3.4.4.)

A4.22. Is the erection of scaffold towers exceeding 50 feet in height above the base done according to the manufacturer's instructions, under supervision of a qualified professional engineer from the civil engineers' staff? (Reference paragraph 2.3.5.5.)

A4.23. Is the use of folding stairway scaffolding confined to sectional width of 4 1/2 feet and 6 feet in length? (Reference paragraph 2.3.6.3.)

A4.24. Mobile Tube and Coupler Scaffolds:

A4.24.1 Are the materials used for the couplers of a structural type (i.e., drop-forged steel, malleable iron, or structural grade aluminum)? (Reference paragraph 2.3.7.2.) ,

A4.24.2. Is the use of gray cast iron prohibited from use for the coupler? (Reference paragraph 2.3.7.2.)

A4.25. Mobile Work Platforms:

A4.25.1. Does the base width conform to the requirements in paragraph 2.3.2.1? (Reference paragraph 2.3.8.2.)

A4.25.2. Are rigid diagonal bracings provided to the vertical members? (Reference paragraph 2.3.8.3.)

A4.26. Mobile Ladder Stands. Are handrails provided on mobile ladder stands that have more than four steps to the top step? (Reference paragraph 2.3.9.4.)

A4.27. Mobile Work Platforms and Ladder Stands:

A4.27.1. Are protective guardrails, mid-rails (when required), and toeboards installed on mobile work platforms and ladder stands used in aircraft maintenance areas where work levels are 10 feet or higher above the ground or floor? (Reference paragraph 2.3.10.3.)

A4.27.2. Are locking pins installed and floor locks engaged before any task or work has started? (Reference paragraph 2.3.10.4.)

A4.27.3. Are reflective materials for making mobile work platforms used to the maximum extent authorized by the appropriate TOs? (Reference paragraph 2.3.10.5.)

A4.27.4. When not being transported, are work platforms secured against movement? (Reference paragraph 2.3.10.5.)

A4.27.5. Are mobile work platform and (or) ladder stands inspected daily before use? (Reference paragraph 2.3.10.6.)

A4.28. When work stands are towed, are the following conditions met?

A4.28.1. Maximum speed limited to 5 miles per hour for tandem towed units; 10 miles per hour for single units? (Reference paragraph 2.3.10.7.3.1.)

A4.28.2. Small stands such as B1, B4, or B5 units towed with a maximum of two stands on a single hitch; double hitch tow vehicles limited to four stands -- two side by side with one tandem on each hitch? (Reference paragraph 2.3.10.7.3.2.)

A4.29. Are mobile platforms and (or) ladders used for fuel cell repair or other hazardous areas (such as refueling unit maintenance) equipped with bonding and (or) ground connections and static license plates to permit personnel to drain accumulated static electricity? (Reference paragraph 2.3.10.8.)

A4.30. Is maintenance of mobile work platforms and ladder stands accomplished as required by applicable 35-series TOs? (Reference paragraph 2.4.10.9.)